Thermal Management System for Automotive Electric Drive Applications

Background

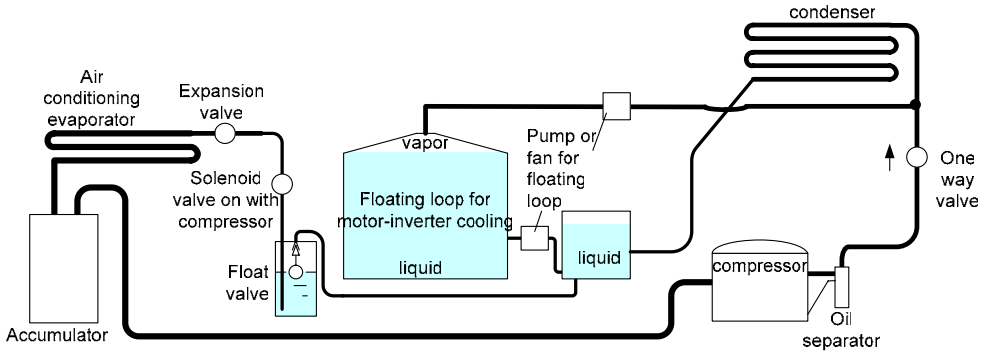
The thermal management of the inverter/converter and motor/generator in hybrid and fuel cell automotive applications play an important role in meeting the FreedomCAR objectives of high power density, low cost, and a 15-year life expectancy.

Under the direction of the U.S. Department of Energy's FreedomCAR and Vehicle Technologies Program, the Oak Ridge National Laboratory (ORNL) is actively working to develop innovative methods to address the issues encountered when electronics and motors are subjected to the harsh thermal environment presented in automotive applications.

Through more efficient means of controlling and removing the heat generated in the electronics and motor, more efficient operation, higher power densities, reductions in size and weight, higher reliability and longer life expectancies can be realized.

The Technology

ORNL has developed a total thermal management system designed to cool both the power electronics and the electric motors in vehicles. It utilizes the existing vehicle air conditioning system to provide the cooling for these components. This secondary "floating loop" is accomplished without a high pressure drop in the system. As such,



Schematic representation of Floating Loop Thermal Management System

Benefits

- Higher power densities
- Smaller motors
- Smaller electronics
- Higher reliability and longer life expectancies
- Lower cost due to part count reduction

it dramatically reduces the amount of power required to operate. Synergism and part count reduction is achieved through the sharing of components between the floating loop and the passenger air conditioning system.

Commercialization

Because this work is in its early stages, there are no commercialization plans at present. However, ORNL is working closely with U.S. auto manufacturers to ensure that the research and development of this technology is closely aligned with their needs so as to provide a clear path to commercialization in the future.

Where Can I Find More Information?

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